



THE SESUG INFORMANT

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If you would like to help out by advertising or writing articles for this newsletter, please contact the editor, Randy Finch, by calling 256-386-2197 or E-mailing rcfinch@tva.gov.

PRESIDENTIAL NOTE

By the time you read this, no doubt cooler weather will have prevailed. However, as I write this in the waning days of July, the Southeast is experiencing heat and drought. A good time to lay back and do as little as possible, right? Well, for a lot of the folks who are involved in the SESUG 2K conference, that is just wrong. The papers that will be presented at the Charlotte, NC, conference this October are being finished by their authors. The section chairs are reviewing the results, contacting authors for last-minute details, and making sure their own materials are in order. The conference chairs (Maribeth Johnson and Phil d'Almada) are reviewing everything from scheduling the presentations to selecting the AV provider to graphics for the *Proceedings* cover to the catering menu for the opening night mixer to ... well, so many other things (including making sure your author has *his* materials in order). In short, SESUG 2K is almost three months away, yet preparations are moving into high gear and will stay that way until the conference itself. We are all looking forward to this year's conference. SESUG has wanted to

have a conference in Charlotte for several years now, and for this year, we were able to do so. I have had the privilege of seeing some of what will be presented and have good information on some of the other papers we will see, and I am very proud of (and pleased with) what I have seen thus far. Keep an eye out for a number of presentations oriented around sophisticated graphical applications, connectivity, and some of the powerful SAS V8 features, as well as data access, manipulation, presentation and analysis (I'm cheating a bit and looking over a preliminary version of the "Table of Contents" for the *SESUG 2K Conference Proceedings*). I think all the attendees will find this to be a very informative conference. Maribeth and Phil and their section chairs are doing a splendid job.

Naturally, SESUG won't end with this

(Continued on page 4)



F. Joseph Kelley

EDITORIAL COMMENT

Well, our illustrious SESUG president was so long-winded, I am left with very little space. So let me get to it. In this issue you'll find our familiar Tech Tip by Ian Whitlock. Will this guy ever quit learning more about SAS? We also have our traditional book review. This time Grace Lossman takes up the pen (or rather, keyboard) to talk about Art Carpenter's new book. And on the back page, you'll find the answers to the puzzle from the previous issue.

But the crème de la crème of this issue is our feature article on SAS efficiencies by our west-coast buddy, Kirk Lafler. Thanks, Kirk.

Also, thanks to SAS Institute for their usual column and to all our sponsors that make this newsletter possible.



Randy C. Finch

Tech Tip



Ian Whitlock

It does what was asked for. It produced 100 data sets and it took 300 steps to do it. A simple macro can generate an awful lot of steps.

If we knew the range of observation numbers for a group then we could use the POINT option to pick out the chosen record. Thus we need a step in front to find out the size of each group.

RANDOM GROUP SAMPLING

A few months ago, a question arose on SAS-L about how to create 100 samples with one record chosen randomly from each group. Say the data look like this:

GROUP	VALUE
1	11
1	12
1	13
2	21
2	22
3	31
3	32
3	33
3	34
...	...

Thus one sample might be:

GROUP	VALUE
1	13
2	21
3	32
...	...

Typical answers said to use a macro. For example, one person wrote:

```
%macro sample(n);
  %do i=1 %to &n;
    data sample;
      set frame;
      choose=ranuni(-1);
    run;

    proc sort data=sample;
      by group choose;
    run;

    data s&i ( drop = choose);
      set sample;
      by group;
      if first.group;
```

```
run;
%end;

%mend sample;

%sample(100)
```

So what's wrong with the answer? It does what was asked for. It produced 100 data sets and it took 300 steps to do it. A simple macro can generate an awful lot of steps.

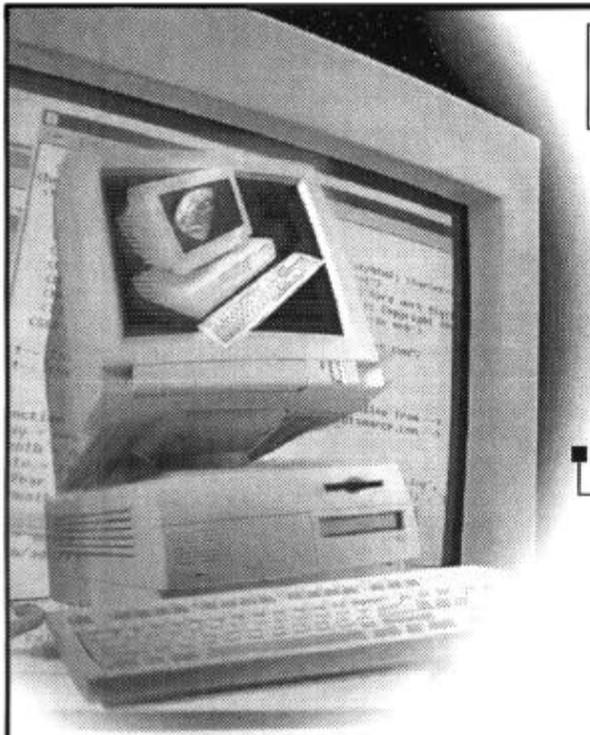
In response to a plea on SAS-L for the ability to specify the output data set at run time, Howard Schreier wrote that he rarely needed such an ability because the only use would be to split a data set up into many little data sets; and it was far better to keep the data together and use by group processing to distinguish sets. The same principle applies here.

Suppose we ask instead how to produce one file with 100 samples, where each sample has one randomly chosen record from each group. If we knew the range of observation numbers for a group then we could use the POINT option to pick out the chosen record. Thus we need a step in front to find out the size of each group. Here is the complete program in three steps.

```
proc summary data = test nway;
  class group ;
  output out = freq ( keep =
    group _freq_ ) ;
run ;

data samples ( keep = sample
  group value ) ;
  retain start end ;
  set freq ;
  end + _freq_ ;
  start = end - _freq_ + 1 ;
  do sample = 1 to 100 ;
    ptr = start + int ((end-
      start+1)* ranuni
      (684946631));
```

(Continued on page 4)



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Tech Tip (continued)

No macro was needed.

We can repeat the run.

*We used three steps
instead of three
hundred, and we don't
have to worry about
handling 100 different
data sets.*

(Continued from page 2)

```
set test point = ptr ;
output samples ;
end;
run ;
```

```
proc sort data = samples ;
  by sample group ;
run ;
```

No macro was needed. We can repeat the run. We used three steps instead of three hundred, and we don't have to worry about handling 100 different data sets. Instead of more macro code to manage the analysis of each sample, we simply need by-group processing in one program. To see the advantage imagine being asked to identify the sample with the largest mean VALUE. In our case the code is simply:

```
proc summary data = samples
  nway ;
  var value ;
  class sample ;
  output out = means
         mean=meanval ;
run ;
```

```
proc summary data = means ;
  id sample ;
  var meanval ;
  output out = maxavg
         max=maxmean ;
run ;
```

I leave it to you to plan how to obtain the same information from the 100 samples asked for.

Presidential Note *(Continued from page 1)*

conference. In fact, plans are already well underway for a very special conference to be held in the late summer of 2001: SSU – the “Southern SAS Users Conference”. This remarkable conference is the result of several years of planning by both the South Central SAS Users Group (SCSUG) and the SouthEast SAS Users Group (SESUG); the co-chairs are Deborah Buck of SCSUG and David Riba of SESUG. The conference will be held in mid-August, 2001, in New Orleans, LA. There will be a great deal more

(Continued on page 15)

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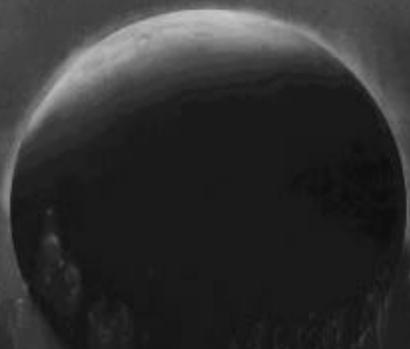
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How To Efficiency Techniques for SAS® Users



Kirk Lafler

Careful attention should be given to each individual program function to have an effect on efficiency.

The simplest of requests can fall prey to one or more efficiency violations, such as retaining unwanted data sets in work space or not subsetting to eliminate undesirable records.

Introduction

As SAS Software becomes increasingly more popular, guidelines for its efficient use grows greater. When using SAS Software in the development of program code and/or applications, efficiency isn't always given the attention it deserves, particularly in the early phases of development. Often, system performance requirements can greatly affect the architectural characteristics and/or behavior that an application exhibits. When this is the case, active user participation is crucial to understanding the needs as well as the successful implementation of performance requirements.

Careful attention should be given to each individual program function to have an effect on efficiency. User expectations, when assessed early (preferably during the early phases of the application development process) help facilitate their measurement once the application is fully operational. Consequently, by adhering to this simple rule, the difficulty associated with trying to improve efficiency as coding nears completion is often minimized.

Efficiency Objectives

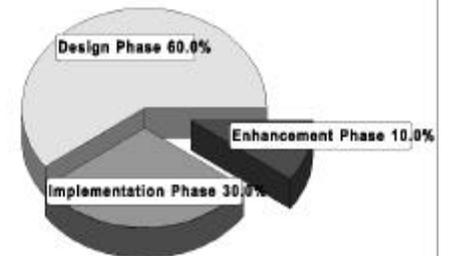
Efficiency objectives are best achieved when implemented as early as possible, preferably during the design phase. But when this is not possible, for example when customizing or inheriting an application, efficiency and performance techniques can still be "tacked-on" as an afterthought to obtain the greatest improvements possible. Efficiency and performance strategies can be classified into the following areas:

1. CPU Time
2. Data Storage
3. Elapsed Time
4. I/O
5. Memory

Jeffrey A. Polzin of SAS Institute Inc. has this to say about measuring efficiency, "CPU time and elapsed time are baseline measurements, since all the other meas-

urements impact these in one way or another." He continues by saying, "... as one measurement is reduced or increased, it influences the others in varying degrees."

Efficiency and Customization

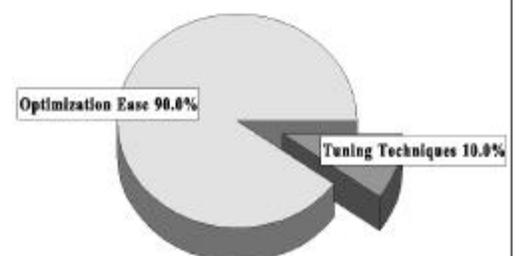


The simplest of requests can fall prey to one or more efficiency violations, such as retaining unwanted data sets in work space or not subsetting to eliminate undesirable records. Much of the efficiency loss can be avoided with better planning prior to beginning the coding process. A well known quip sums it up best, "most people don't plan to fail - they just fail to plan." Fortunately, efficiency gains can be realized as long as a few simple guidelines are followed.

Guidelines to Hold Dear

The difference between an application that has been optimized versus one that has not is often dramatic. By adhering to practical guidelines, your application code will achieve efficiency in direct relationship to economies of scale. Generally, the first

Efficiency Scale



(Continued on page 8)

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How To (continued)

Generally, the first 90% of efficiency improvements can be gained relatively quickly and easily by applying simple strategies. It's often the final 10% that, if pursued, proves to be the challenge.

Analyzing the responses from each participant provided a better appreciation for what users and application developers look for as they apply efficiency methods and strategies.

(Continued from page 6)

90% of efficiency improvements can be gained relatively quickly and easily by applying simple strategies. It's often the final 10% that, if pursued, proves to be the challenge. Consequently, you will need to be the judge of whether your application has reached "relative" optimal efficiency while maintaining a virtual balance between time and cost.

The following suggestions are not meant to be an exhaustive review of all known efficiency techniques, but as a sampling of proven methods that can provide some measure of efficiency in SAS programs.

Efficiency techniques are presented for the following resource areas: CPU time, data storage, I/O, memory, and programming time. Program code examples are illustrated in **Table 1 (page 16)**.

CPU Time

- 1) Use KEEP or DROP statements to retain desired variables.
- 2) Create and use indexes with large data sets.
- 3) Utilize macros for redundant code.
- 4) Use IF-THEN/ELSE statements to process data.
- 5) Use the DATASETS procedure COPY statement to copy data sets with indexes.
- 6) Use the SQL procedure to consolidate the number of steps.
- 7) Turn off the Macro facility when not needed.
- 8) Avoid unnecessary sorting - plan its use.
- 9) Use a CLASS statement in available procedures.
- 10) Use the Stored Program Facility for complex DATA steps.

Data Storage

- 1) Use KEEP or DROP statements to retain desired variables.
- 2) Use LENGTH statements to reduce variable size.
- 3) Use data compression strategies.
- 4) Create character variables as much as possible.
- 5) Use DATA _NULL_ steps for processing

null data sets.

I/O

- 1) Read only data that is needed.
- 2) Use WHERE statements to subset data.
- 3) Use data compression for large data sets.
- 4) Use the DATASETS procedure COPY statement to copy data sets with indexes.
- 5) Use the SQL procedure to consolidate code.
- 6) Store data in SAS data sets, not external files.
- 7) Perform data subsets early and at same time.
- 8) Use KEEP or DROP statements to retain desired variables.

Memory

- 1) Read only data that is needed.
- 2) Use WHERE conditions when possible.
- 3) Use the DATASETS procedure COPY statement to copy data sets with indexes.

Programming Time

- 1) Use the SQL procedure for code simplification.
- 2) Use procedures whenever possible.
- 3) Document programs and routines with comments.
- 4) Utilize macros for redundant code.
- 5) Code for unknown data values.
- 6) Assign descriptive and meaningful variable names.
- 7) Store formats and labels with the SAS data sets that use them.
- 8) Test program code using "complete" test data.

Survey Results

A survey was conducted to elicit responses from participants on efficiency and performance. The **Efficiency and Performance Survey** is illustrated in **Table 2 (page 17)**. Analyzing the responses from each participant provided a better appreciation for what users and application developers look for as they apply efficiency

(Continued on page 12)

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*SESUG 2K
 Sneak Preview*

	Saturday	Sunday	Monday	Tuesday
Day	<ul style="list-style-type: none"> • Weekend Workshops – Afternoon ❖ Universal Data Access... <i>Riba</i> ❖ Introduction to the SAS Output Delivery System <i>Bryant, Muller, and Pass</i> 	<ul style="list-style-type: none"> • Weekend Workshops – Morning ❖ Turning External Data into SAS Data <i>Kuligowski</i> ❖ Web 101 <i>Bahler</i> <p>Weekend Workshops – Afternoon</p> <ul style="list-style-type: none"> ❖ Results with ODS <i>Lafler</i> ❖ Merging, Combining, and Subsetting ... <i>Foley</i> 	<ul style="list-style-type: none"> • Hands-On Workshops • Concurrent Sessions (all day) • Meet the Presenter Luncheon • SAS Institute Formal On-line Demos • SAS Demo Room 	<ul style="list-style-type: none"> • Hands-On Workshops • Concurrent Sessions (until 3pm) • Meet the Presenter Luncheon • SAS Institute Formal On-line Demos • SAS Demo Room • Closing Session / Giveaways
Evening		<ul style="list-style-type: none"> • Welcome Dinner • Opening Session / Keynote Speaker • Dessert Reception 	<ul style="list-style-type: none"> • Mixer • SESUG After Hours (various Charlotte restaurants) 	

Want to attend?

If you haven't received a **Registration Packet**, e-mail us and we'll see that you get one. Also, check the SESUG web site, <http://www.sesug.org>, for on-line web registration and updated information as it becomes available!

Plan to come to Charlotte early and take advantage of the **Weekend Workshops**. These workshops will be half-day sessions held on Saturday afternoon and Sunday morning and afternoon. The costs of these workshops (\$75 each) are not included in the cost of the conference so register early before space fills up!

The *SESUG 2K* Conference will provide presentations geared toward all SAS programming levels from novice to advanced. This presents a golden opportunity to learn more about the SAS System not only from those who have developed it but also from those who use it everyday! Planned concurrent sessions for Monday and Tuesday will include:

-
- **Advanced and Beginning Tutorials**
 - **Applications Development**
 - **Emerging Technologies**
 - **Coders' Corner**
 - **Information Visualization**
 - **SAS Solutions**
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 - **Hands-On Workshops**
-

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If you'd like to help support the *SESUG 2K* conference, we are offering 4 levels of sponsorship again this year. Please contact Randy Finch at 256.386.2197 or rcfinch@tva.gov for more information.

Want to Volunteer?

There are many opportunities for you to volunteer to help with the conference. You can volunteer to help by coordinating a session or helping attendees pick up their conference registration materials. This is a great way to meet people and to contribute to this conference that is put together entirely by SAS Users. If you're interested, please contact Clara Waterman, our Volunteer Coordinator, at clwaterman@aol.com or the *SESUG 2K* Conference Co-Chairs.

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See you in Charlotte!

How To (continued)

Unfortunately for others, a lack of familiarity with effective techniques often results in a situation where the application works, but may not realize its true potential.

It was found that using the SQL Pass-Through Facility was virtually "never" used by survey participants.

(Continued from page 8)
methods and strategies.

The original purpose of the survey was to assess the general level of understanding that people have of various efficiency methods and techniques. The results were interesting.

The majority of users and application developers want their applications to be as efficient as possible. Many go to great lengths to implement sound efficiency strategies and techniques achieving splendid results. Unfortunately for others, a lack of familiarity with effective techniques often results in a situation where the application works, but may not realize its true potential.

Survey participants often indicated that efficiency and performance tuning is not only important, but essential to their application. Many cite response time as a critical objective and are always looking for ways to improve this benchmark. Charles Edwin Shipp of Shipp Consulting offers these comments on applying efficiency techniques, "Efficiency shouldn't be considered as a one-time activity. It is best to treat it as a continuing process of reaching an optimal balance between competing resources and activities."

Other universally accepted findings consist of using WHERE, LENGTH, CLASS, and KEEP/DROP statements; avoiding unnecessary sorting; using SAS functions; and constructing DATA _NULL_ steps as effective techniques to improve the efficiency in an application.

Techniques receiving "strong" (between sometimes and always), but not unanimous, support among survey participants are using system options to control resources; deleting unwanted WORK space data sets; combining (consolidating) steps; using formats and informats; using indexes; using the APPEND procedure to concatenate; constructing IF-THEN/ELSE statements for conditional processing; and saving intermediate files, especially for large multi-step jobs.

Sunil Kumar Gupta of Gupta Programming offers these suggestions on assigning informats, formats, and labels, "Informats, formats, and labels are stored with many

of our important SAS data sets to minimize processing time. An additional reason for using this technique is that many popular procedures use stored formats and labels as they produce output, eliminating the need to assign them in each individual step. This in itself provides added incentives and value for programmers and end-users, especially since reporting requirements are usually time critical."

Techniques cited by survey participants as "sometimes" being used include using DATA step options; using data compression; conserving on memory by turning off options; using the SQL procedure to consolidate multiple operations; using the Stored Program Facility; creating and using DATA and SQL views; and using the DATASETS procedure COPY statement for indexes.

It was found that using the SQL Pass-Through Facility was virtually "never" used by survey participants.

Learning Necessary Techniques

Survey responses revealed the following concerns:

- 1) An insufficient level of formal training exists in the areas relevant to efficiency and performance.
- 2) A failure to plan in advance of the coding phase.
- 3) Insufficient time and inadequate budgets can often be attributed to ineffective planning and implementation of efficiency strategies.

Where Techniques are Learned



So how do people learn about the various efficiency techniques? A small percentage learn through formal training. Others

(Continued on page 13)

(Continued from page 12)

find published guidelines (e.g., book(s), manuals, articles, etc.) on the subject. But the vast majority learn valuable techniques as a result of a combination of prior experiences, through acquaintances (e.g., User Groups), and/or on the job. This "sink or swim" method may, at best, result in a relatively small level of improvement in efficiency, but any improvement is better than no improvement. Consequently, by adhering to a practical set of efficiency guidelines, an application can benefit significantly for many years to come.

Conclusion

The value of implementing efficiency and performance strategies into an application can not be over-emphasized. Careful attention should be given to individual program functions, since one or more efficiency techniques can often affect the architectural characteristics and/or behavior an application exhibits.

Efficiency techniques are learned in a variety of ways. Some learn through formal classroom instruction, while others find published guidelines such as books, manuals, articles, and video tapes to acquire the necessary understanding associated with efficiency. But the vast majority learn through other's experiences, as well as their own, by word-of-mouth, and on the job. Whatever the means, a little efficiency goes a long way.

Acknowledgments

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Author Information

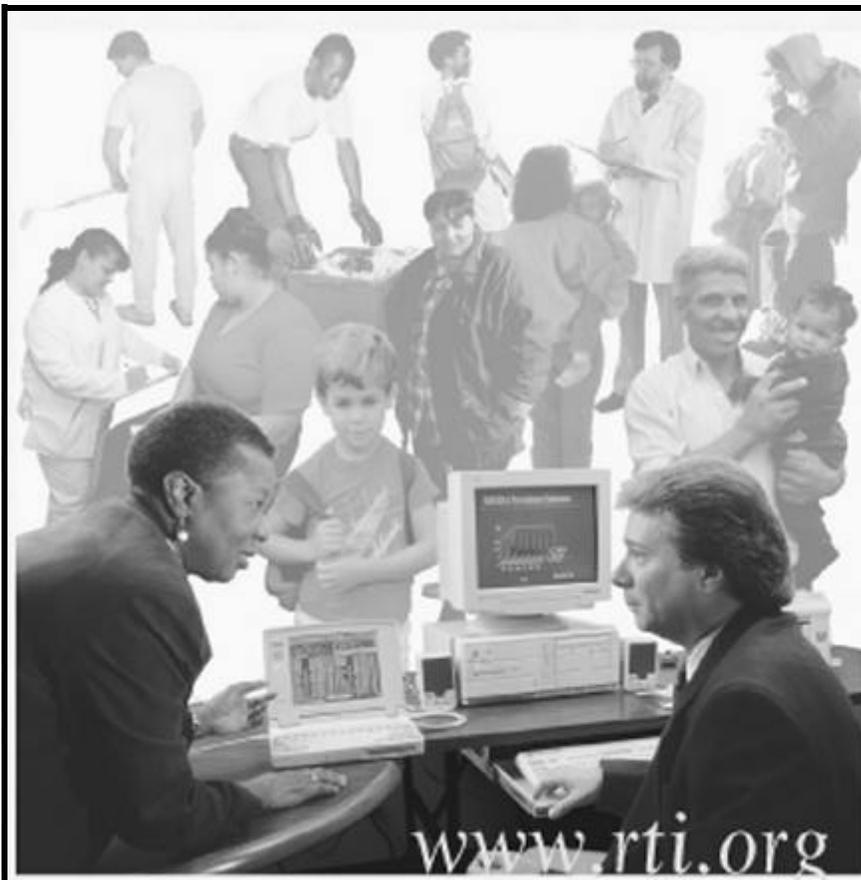
Kirk Paul Lafler is senior consultant, founder of Software Intelligence Corporation, and SAS Institute Quality Partner™ with 22 years experience supporting enterprise-wide computer systems. As an industry-invited speaker, author, and consultant,

(Continued on page 15)

How To (continued)

But the vast majority learn valuable techniques as a result of a combination of prior experiences, through acquaintances (e.g., User Groups), and/or on the job.

Careful attention should be given to individual program functions, since one or more efficiency techniques can often affect the architectural characteristics and/or behavior an application exhibits.



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Quick Tip (continued)

(Continued from page 13)

he has advised organizations on a variety of information technology (IT) issues, including Year 2000 initiatives. He has written three books, *The Output Delivery System (ODS) Answer Book*, *The Year 2000 How To Guide for Medical Laboratories*, and *The Year 2000 Quick Reference & Pocket Guide for Computer Hardware and Software*. He has written numerous technology articles for professional journals and is a leading authority on technology issues and solutions. Kirk has bachelor's and master's degrees in Management Science Systems Analysis from the University of Miami and pursued post-graduate studies in Telecommunications Management from George Washington University.

The author welcomes comments and suggestions. For contact information, see ad to the right.

Presidential Note (Continued from page 4)

information about SSU 2001 at Charlotte and in the months following, so that can await a future column. In 2002, SCSUG and SESUG will be going their separate ways; the preliminary work for SESUG 2002 will be done by the time we all get together in Charlotte, and soon after the Planning Committee will be at work on SESUG 2003.

Now, maybe all of this sounds as though there is a huge body of skilled, hard-working men and women, professionals at what they do, deftly guiding the SESUG ship of state and managing its conferences. Well, there are some very skilled, very hard-working folks who do everything they can to make sure the conference is what you expect it to be. I strongly encourage all attendees to get involved in these conferences. I sincerely believe participation, at any level, yields a far richer conference experience. If you want to participate in SESUG 2K, SSU 2001, or others), say so. Don't wait to be asked; do a poster, a Coders' Corner presentation, a contributed paper, be a session coordinator! Attend the SESUG or SSU BOFs ("Birds of a Feather" sessions) and sign up. You will be glad you did.

I'll get off my soabbox now, and let you return to the Summer of '00. If you need information about SESUG, you may reach me at jkelly@uga.edu. And now, as part of my ongoing efforts to provide information about SAS, I'll examine using ODBC with Proc SQL. First we want to ... Goodness, I just noticed that SESUG 2K is closer than I thought, and I still haven't finished my paper. Maybe I should call a halt here...



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Table 1. Program Code Examples

The following program examples illustrate the application of a few popular efficiency techniques. Techniques are presented in the areas of CPU time, data storage, I/O, memory, and programming time.

1. Using the KEEP statement as a data set option instructs the SAS System to load only the specified variables into the program data vector (PDV), eliminating all other variables from being loaded.

```
data af_users;
  set sands.members
    (keep=name company phone user);
  if user = 'SAS/AF';
run;
```

2. The CLASS statement provides the ability to perform by-group processing without the need for data to be sorted first in a separate step. Consequently, CPU time can be saved when data is not already in the desired order. The CLASS statement can be used in the MEANS and SUMMARY procedure.

```
proc means data=mortgage;
  var prin interest;
  class state;
run;
```

3. By using IF-THEN/ELSE statements opposed to IF-THEN statements without the ELSE, the SAS System stops processing the conditional logic once a condition holds true for any observation.

```
data capitol;
  set states;
  if state='CA' then capitol =
    'Sacramento';
  else
  if state='FL' then capitol = 'Tallahassee';
  else
  if state='TX' then capitol = 'Austin';
run;
```

4. To avoid using default lengths for variables in a SAS data set, use the LENGTH statement. Significant space can be saved for numeric variables containing integers since the 8 byte default length is reduced to the specified size. Storage space can be reduced significantly.

4. (Continued)

```
data _null_;
  length pageno rptdate 4;
  set sales;
  file report header=h;
  put @10 item $20.
    @35 sales comma6.2;
return;
h:
  rptdate=today();
  pageno + 1;
  put @20 'Sales Report'
    / @1 rptdate mmddyy10.
    / @30 'Page ' pageno 4. //;
return;
run;
```

5. To subset data without first running a DATA step use a WHERE statement in a procedure. I/O and memory requirements may be better for it.

```
proc print data=af_users n noobs;
  where user = 'SAS/AF';
  title1 'SAS/AF Programmers/Users';
run;
```

6. Use the SQL procedure to simplify and consolidate coding requirements. CPU, I/O, and programming time may improve.

```
proc sql;
  title1 'SAS/AF Programmers/Users';
  select *
  from sands.members
  where user = 'SAS/AF'
  order by name;
quit;
```

7. To improve data storage and I/O requirements, consider compressing large data sets.

```
data sands.members (compress = yes);
  < additional statements >
run;
```

Table 2. Efficiency and Performance Survey

EFFICIENCY AND PERFORMANCE SURVEY

Contact: _____ Organization: _____
 Telephone: _____ Contact Date: _____

"I am conducting a survey for a regional SAS user group paper that I am writing. The topic of the paper is efficiency and how it relates to the SAS Software. Could you spare a few minutes to answer a few questions on this subject?"

1. Are efficiency and performance issues important in your environment? Yes No Sometimes
2. Have you received any training (formal or informal) in efficiency and performance strategies? Yes No
3. Do you take the time to resolve efficiency and performance issues in an application? Yes No Sometimes
4. Rate whether the following efficiency measurement categories have importance in your environment.
 (Use the following rating scale: 1=Not Important, 2=Somewhat Important, 3=Very Important.)
 a. _____ CPU Time b. _____ Data Storage c. _____ Elapsed Time d. _____ I/O e. _____ Memory
5. In response to question #4, which measurement has the greatest importance in your environment? _____
 Why?: _____
6. At what time(s) during the application development process do you consider using efficiency and performance techniques?

<input type="checkbox"/> Requirements Definition Phase	<input type="checkbox"/> Testing Phase
<input type="checkbox"/> Analysis Phase	<input type="checkbox"/> Implementation Phase
<input type="checkbox"/> Design Phase	<input type="checkbox"/> Maintenance/Enhancement Phase
<input type="checkbox"/> Coding Phase	
7. Rate the following techniques and/or strategies that you have used in your environment to improve a program's/application's efficiency and/or performance? (Use the following rating scale: 1=Never, 2=Sometimes, 3=Always.)

_____	Use System Options such as BUFNO=, BUFOBS=, BUFSIZE= COMPRESS=, etc.
_____	Use DATA Step Options such as NOMISS or NOSTMTID.
_____	Use the LENGTH Statement to reduce the size of numeric variables and storage space.
_____	Use numeric variables for analysis, otherwise create character variables - less CPU intensive.
_____	Use the KEEP or DROP statements to control only variables desired.
_____	Delete Unwanted Data Sets in the WORK area.
_____	Combine Steps to minimize the number of DATA and/or PROC steps.
_____	Use Data Compression.
_____	Conserve on Memory (e.g., turning off NOMACRO, array processing)
_____	Use Formats and Informats to save CPU during complex logic assignments.
_____	Avoid unnecessary sorting with PROC SORT.
_____	Control sorting by combining two or more variables at a time when sorting is necessary.
_____	Use Subsetting IF statements to subset data sets.
_____	Use WHERE statements to subset data sets.
_____	Use indexes to optimize the retrieval of data.
_____	Construct IF-THEN/ELSE statements to process condition(s) with greatest frequency first.
_____	Save intermediate files in multi-step applications.
_____	Use PROC APPEND versus SET statement to concatenate data sets.
_____	Use PROC SQL to consolidate multiple operations into one step.
_____	Use the PROC SQL Pass-Through Facility to pass logic to target database for processing.
_____	Use the Stored Program Facility to store SAS DATA steps in a compiled format.
_____	Use DATA Views and SQL Views to create "virtual" tables.
_____	Use SAS Functions to perform common tasks.
_____	Use the DATASETS Procedure COPY statement to copy data sets with built-in indexes.
_____	Use the DATA _NULL_ step to avoid creating a data set when one is not needed but processing is.
_____	Use a CLASS statement in procedures that support it to avoid having to sort data.

Other: _____

8. Would you like a copy of the completed paper? Yes No

Thank you for participating in this survey!

Book Review



Grace Lossman

The annotate facility for SAS/GRAPH is somewhat analogous to the macro facility in SAS. It extends the somewhat limited capabilities of SAS/GRAPH, allowing the user to customize by adding drawings, line types, fill patterns, line movements, etc.

I look forward to a second edition of this text and applaud Art for his current effort.

“Annotate: Simply the Basics” by Art Carpenter

Art Carpenter is a well-respected member of the SAS community and the author of many excellent papers and several top-notch texts. His speaking engagements alone could probably keep him busy for many years to come!

His newest effort “Annotate: Simply the Basics” has six chapters: Introduction to the Annotate Facility, The Annotate Process (What, How, and Where), Simple Annotate Examples, Building the Annotate Data Set, Enhancing Output from SAS/GRAPH Procedures and Using Annotate Macros as Shortcuts.

The annotate facility for SAS/GRAPH is somewhat analogous to the macro facility in SAS. It extends the somewhat limited capabilities of SAS/GRAPH, allowing the user to customize by adding drawings, line types, fill patterns, line movements, etc. Annotate is not mentioned in many elementary texts and, although very simple, is largely underused. This book is an advocacy for a more widespread use of the annotate facility and gives a sense of when it is needed and how it is approached.

Additionally, this introductory text gives core material to the beginning programmer who may be overwhelmed by the ton of SAS materials available. The book follows the format in the SAS/GRAPH manuals and explains some areas in more detail. Writing about SAS’s annotate area is difficult and, indeed, most cumbersome, particularly, in a book format. While it is best accomplished where give and take can occur with an audience, this text has tackled that problem admirably.

The first three chapters introduce the facility and explain the basics of the process, along with partial simple examples. This reviewer would like to see an expansion of these three chapters to include more explanatory material and full-length examples illustrating diverse uses. While more examples are given in later chapters pinpointing what may be accomplished with various SAS/GRAPH procedures, at this stage a labeling of each step along with a diagram of how this step accomplished a certain element in the output

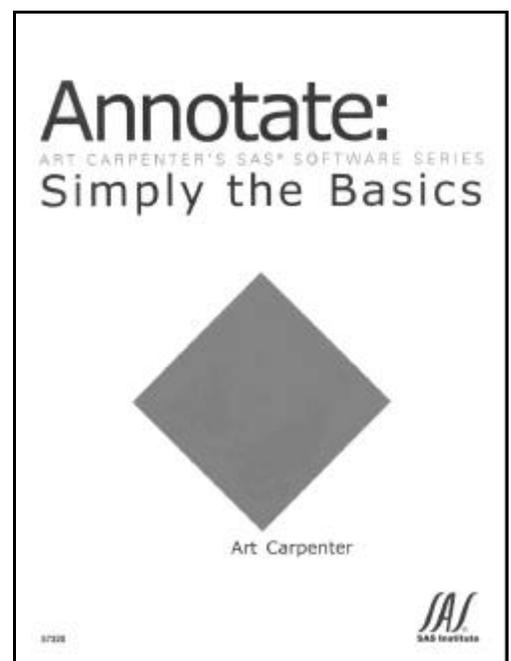
would be helpful. While this approach is partially taken, increased, well-labeled examples would be a plus.

Even though there are nine short pages in Chapter 4, Building the Annotate Data Set, these are the heart of the text. It is here where manipulation is learned. This chapter is well written and presented but there simply isn’t enough material.

Chapter 5 is thoughtfully done and supplies diverse examples and situations in a methodical and clear manner. The most commonly used SAS/GRAPH procedures are referenced and Art clearly presents how to combine annotate with SAS/GRAPH. This is an application chapter and comes off cleanly. The book is strongest when dealing with this type of material.

Chapter 6 addresses using annotate macros as shortcuts. While interesting, I believe expansion of the more terse sections would be of greater value.

I look forward to a second edition of this text and applaud Art for his current effort. This topic is much needed in the current repertoire of manuals!



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For those of us who work with users, this is an especially exciting time. We're pleased to continue our support of SESUG, and we're proud of the many services that SESUG provides to the SAS user community. Our partnership with SESUG is a very good thing!

Contacts

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Make plans now to attend SUGI 26, scheduled for April 22-25, 2001 in Long Beach, California. This year's Conference Chair is Frank Fry. The Call for Papers and Participation has been issued and closes on Sept. 25. We're looking for contributed papers, volunteers, and suggestions. Visit the Web site www.sas.com/sugi.

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From the Institute



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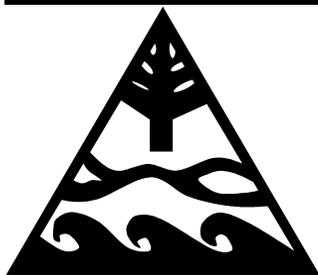
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SAS BOOT CAMP WAR GAMES – ANSWERS

In the last issue of The SESUG Informant, this story appeared with 36 SAS procedure names (some common, some obscure) hidden within it. Here is the solution to that puzzle. The 36 procedure names are shown in underlined italics. How many did you find? Were there other procedure names of which even I was unaware?

“Report!” the Red Team sergeant exploded as he and an MP raced to the de-con tents. He was not a mean sergeant, but as ranking officer, he had to take action frequently. Now he needed his staff’s view of the suspected ongoing plot to disable their SAS programs. “I need a summary of what you have.”

The MP responded, “We have Jim Matthews, Mic Porter, and Philip d’Souza in custody. They insist they have no part in the plot, and we can’t build a strong case against them. Shall I release them, sir?”

“What other options do we have? Perhaps our sources were wrong. I’ve done a lot for Matthews. It’s hard to believe he’s the sort of man to betray me. And d’Souza has always been a man of high standards. And my old buddy Mic, important is his middle name. We can’t stomp men underfoot like this. Let them go!”

“I’m in!” yelled a private. His display indicated he had hacked into the Green Team’s server. The staff’s calculations had been correct. The enemy’s server was protected by an encoded version of an old Fortran table of keywords. With his database (DB) loaded, he quickly issued a few SQL commands and the server’s primary app ended. This private was as stealthy as a bobcat. A log appeared onscreen charting every maneuver he had made.

The sergeant smiled slyly. “Our data set should be safe now. I need a printout of this. Send another print to Lieutenant Sanders. Do you copy?”

“YES SIR!” snapped the private.

The sergeant lifted the handset on the radio. “Data Pel Abel, this is Data Peco Python. Mission accomplished.”

The Red Team was victorious. They had passed the hardest test ever given them.

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